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Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: May 27, 2004

REPLY TO
ATTN OF: CBFO:QA:DSM:GS:04-1509:UFC 2300.00

SUBJECT: Audit Report A-04-25 of Lawrence Livermore National Laboratory

TO: Ted Hedahl, National TRU Project Manager, WTS

The Carlsbad Field Office (CBFO) conducted a certification audit of the Lawrence Livermore National Laboratory (LLNL), Central Characterization Project (CCP) waste characterization activities. The audit was conducted on May 4-7, 2004. The Audit team concluded that the LLNL technical and quality assurance programs for these activities were adequate in accordance with the WIPP Hazardous Waste Facility Permit, the CBFO Contact-Handled Transuranic Waste Acceptance Criteria for the WIPP, and the CBFO Quality Assurance Program Document.

The audit team also concluded that overall the LLNL/CCP procedures were being satisfactorily implemented and the evaluated processes were effective with the exception of the PDP for NDA that had not been completed. The PDP for NDA was determined to be indeterminate. It must be successfully completed prior to the shipment of waste to WIPP. As a result of the audit two (2) CBFO Corrective Action Reports (CARs) 04-020 and 04-026 were issued. They have been transmitted to CCP under a separate cover letter.

If you have any questions or comments, please contact me at (505) 234-7491

Dennis S. Miehl
Quality Assurance Specialist

Attachment

040536



Ted Hedahl

-2-

May 27, 2004

cc: w/attachment

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CBFO QA File

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U.S. DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE

AUDIT REPORT
OF THE
LAWRENCE LIVERMORE NATIONAL LABORATORY
UTILIZING THE
CENTRAL CHARACTERIZATION PROJECT

AUDIT NUMBER A-04-25

May 4 – 7, 2004

TRANSURANIC WASTE CHARACTERIZATION AND
CERTIFICATION PROGRAM



Prepared by: Thomas Putnam Date: 5-26-04
Thomas Putnam, CTAC
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Approved by: Ava L. Holland Date: 5/27/04
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1.0 EXECUTIVE SUMMARY

Carlsbad Field Office (CBFO) Audit A-04-25 was conducted to evaluate the adequacy, implementation, and effectiveness of the Lawrence Livermore National Laboratory Central Characterization Project (LLNL/CCP). This audit was conducted May 4 – 7, 2004, in Livermore, California, and evaluated the CCP transuranic (TRU) waste characterization and certification activities related to Summary Category Group S5000, debris waste. The audit team assessed the adequacy, implementation, and effectiveness of both technical and quality assurance (QA) activities.

The audit scope and methodology consisted of an extensive review of the characterization activities, interviews with CCP personnel, reviews of batch data reports (BDRs) and other documentation associated with each of the characterization techniques. Evaluation of completed BDRs and associated documentation provided objective evidence of proper implementation of the various characterization processes. This assessment confirmed the CCP programmatic interfaces established with LLNL, the CCP administrative controls needed to manage the characterization activities, and the characterization processes and activities conducted at the LLNL. The activities evaluated included characterization with a High Efficiency Neutron Counter (HENC) using a nondestructive assay (NDA) 2000 system, a mobile real-time radiography (RTR) system, visual examination (VE), and the on-line integrated system for headspace gas (HSG) sampling and analysis. In addition, the process for developing the acceptable knowledge (AK) documentation was evaluated.

The audit team concluded that the CCP technical and QA procedures were adequate relative to the flow-down of requirements from the CBFO Quality Assurance Program Document (QAPD), the Waste Analysis Plan (WAP) of the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (HWFP), and the Contact-Handled Transuranic Waste Acceptance Criteria (WAC) for the Waste Isolation Pilot Plant (WIPP). The audit team also concluded that the assessed activities, with the exception of issues involving the Acceptable Knowledge (AK) Summary Report and the report for Total Measurement Uncertainty (TMU) for the HENC, were being satisfactorily implemented in accordance with the CCP Quality Assurance Project Plan (QAPjP) and implementing procedures. The established technical processes and the QA program and procedures were also determined to be satisfactorily implemented and effective.

The audit team identified two conditions adverse to quality (CAQs) resulting in the issuance of two CBFO corrective action reports (CARs). The CARs identified conditions adverse to quality concerning the AK Summary Report that detailed the combining of drums containing solids with a debris waste stream and the CCP report *Total Measurement Uncertainty for the WIPP High Efficiency Neutron Counter (HENC)*, being inadequate by not fully representing the contribution of the determination of drum density. These CARs were deemed to be non-significant because the waste has not been shipped. Nine isolated deficiencies requiring only remedial corrective actions were corrected during the audit (CDA). No Observations resulted from the audit and five Recommendations were offered for management consideration. The CARs, CDAs, and Recommendations are described in Section 6.

2.0 SCOPE

CBFO Audit A-04-25 was conducted to evaluate the adequacy, implementation, and effectiveness of the CCP QA Program and technical processes used to perform TRU waste characterization activities for retrievably stored debris waste located or generated at the LLNL. In addition, the audit team examined activities and documentation that confirmed the adequacy, implementation and effectiveness of the characterization processes conducted at the LLNL, for NDA (HENC), RTR, VE and HSG, in accordance with CCP implementing documents. The audit team also evaluated the processes for developing and confirming AK documentation.

The following QA elements were evaluated in accordance with the CBFO QAPD:

- Organization
- QA Program
- Personnel Qualification and Training
- Quality Improvement
- Documents and Records
- Work Processes
- Procurement
- Grading Program
- Assessments
- Sample Control
- Software Quality Assurance

The following technical elements were evaluated to verify compliance with the WAP and the CH-WAC:

- Data Validation and Verification (V&V)
- Acceptable Knowledge (AK)
- Nondestructive Assay (NDA)
- Real-Time Radiography (RTR)
- Visual Examination (VE)
- Headspace Gas Sampling and Analysis (HSG)
- Sample Design
- Performance Demonstration Program (PDP)
- Waste Certification activities (e.g., Waste Stream Profile Form)
- WIPP Waste Information System (WWIS)

The evaluation of waste characterization and certification activities and documents was based on current revisions of the following documents:

- *Quality Assurance Program Document (QAPD)*, DOE-CBFO-94-1012
- *Hazardous Waste Facility Permit Waste Isolation Pilot Plant EPA No. NM4890139088-TSDF*, by the New Mexico Environment Department, dated October 27, 1999, including all applicable modifications
- *Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WAC)*, DOE/WIPP-02-3122

Programmatic and technical checklists were developed from the current revisions of the following documents:

- *CCP Transuranic Waste Quality Assurance Characterization Project Plan (QAPjP)*, CCP-PO-001
- *CCP Transuranic Waste Certification Plan*, CCP-PO-002
- *CCP/LLNL Interface Document*, CCP-PO-014

Related CCP QA and technical implementing procedures (see Attachment 2)

3.0 AUDIT TEAM, INSPECTORS, AND OBSERVERS

AUDITORS/TECHNICAL SPECIALISTS

Steve Calvert	QA Manager, CBFO Technical Assistance Contractor (CTAC)
Thomas Putnam	Audit Team Leader, CTAC
Prissy Dugger	Auditor, CTAC
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Wayne Ledford	NDE (RTR) and VE Technical Specialist, CTAC
Patrick Kelly	NDA Technical Specialist, CTAC
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INSPECTORS/OBSERVERS

June Dreith	Environmental Protection Agency (EPA) Inspector/Tech Law
Mike Eagle	EPA Inspector
Ed Feltcorn	EPA Inspector
Steve Holmes	New Mexico Environment Department (NMED)

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Jerry Rossman	EPA Inspector/Trinity
David Stuenkel	EPA Inspector/Trinity
Bob Thielke	NMED/EPA Inspector/TechLaw
Steve Zappe	NMED

AUDIT PARTICIPANTS

A pre-audit conference was held in the conference room of Building 482 on May 4, 2004. Daily management briefings were held with LLNL/CCP management to discuss the progress of the audit and potential deficiencies. The audit was concluded with a post-audit conference held in the conference room of Building 5475 on May 7, 2004. Attachment 1 contains a list of the LLNL/CCP personnel contacted during the audit.

SUMMARY OF AUDIT RESULTS

5.1 Program Adequacy, Implementation, and Effectiveness

The audit team concluded that the documented technical and QA programs for the LLNL/CCP TRU waste characterization processes adequately reflect the appropriate requirements from the CBFO QAPD, the WIPP HWFP, and the CH-WAC. The audit team also concluded that, with the exception of issues involving the AK Summary Report and the TMU report for the HENC, the documented technical and QA programs are being satisfactorily implemented, and are effective.

Quality Assurance Program Audit Activities

5.2.1 Organization and QA Program

The audit team interviewed management personnel and reviewed documentation to verify that LLNL/CCP met the requirements of the QAPD, Section 1.1, Organization and Quality Assurance Program. Regarding the grading of items and activities, CCP has implemented their graded approach program through procedure CCP-QP-001 and a database that lists the quality levels for items to be purchased. This database cannot be accessed at LLNL. Therefore CCP/LLNL personnel determine what supplies are needed and CCP personnel in Carlsbad check the graded approach database and prepare purchase requisitions. No concerns were identified.

Overall, Organization and the QA Program were determined to be adequate, satisfactorily implemented, and effective.

5.2.2 Personnel Qualification and Training

The audit team evaluated the CCP Training and Qualification procedures for adequacy with respect to the CBFO QAPD, Section 1.2 requirements relating to personnel training and qualification activities conducted at the LLNL. The audit team also evaluated implementation of these procedures with respect to preparation of job and training

needs analysis, personnel qualification and certification, training materials development and review, and training records administration. Documentation of personnel qualification and requalification and on-the-job training was reviewed. Documentation of the administration of the training program included review of records for training needs determination, training waivers/exceptions, training completion, and position appointment. Documentation reviewed included records of training, qualification, and certification for management, operations, and contract personnel performing work at the LLNL/CCP site. The audit team determined that the training and qualification programs are adequate and that they are evaluated to assure effectiveness. There were no training-related deficiencies identified during the audit. One training-related Recommendation (see Recommendation 4) was made for management consideration related to addition of a signature line on qualification cards for technical supervisors who review training material.

Overall, the audit team determined that LLNL/CCP Training and Qualification procedures are adequate, satisfactorily implemented, and effective.

5.2.3 Quality Improvement

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD, Section 1.3, Quality Improvement. The audit team reviewed quality improvement with respect to improvement of processes, the identification of problems, documenting problems within the nonconformance process and corrective actions necessary to correct the problems. No concerns were identified.

Overall, Quality Improvement activities were determined to be adequate, satisfactorily implemented, and effective.

5.2.4 Documents and Records

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD Sections 1.4, Documents, and 1.5, Records. No concern, were identified.

Overall, Documents and Records activities were determined to be adequate, satisfactorily implemented, and effective.

5.2.5 Work Processes

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD, Section 2.1, Work Processes. The audit team reviewed work processes related to work being performed, implementing procedures, the identification and control of items, and the handling, storage and shipment of those items. No concerns were identified.

Overall, Work Processes were determined to be adequate, satisfactorily implemented, and effective.

Procurement

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD Section 2.3, Procurement. No concerns were identified.

Overall, Procurement activities were determined to be adequate, satisfactorily implemented, and effective.

Assessments

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD Sections 3.1, Management Assessment, and 3.2, Independent Assessment. No concerns were identified.

Overall, Assessments were determined to be adequate, satisfactorily implemented, and effective.

5.2.8 Sample Control

The audit team interviewed personnel and reviewed documentation to verify that LLNL/CCP met the requirements of QAPD Section 4, Sample Control Requirements. No concerns were identified.

Overall, Sample Control was determined to be adequate, satisfactorily implemented, and effective.

5.2.9 Software

The audit team evaluated the CCP software QA procedures for adequacy with respect to the CBFO QAPD, Section 6, Software Requirements as related to software QA activities conducted at the LLNL location. The audit team also evaluated implementation of these procedures with respect to procurement of software-related services, software development, change control, and configuration management. The evaluation included a review of the process used by CCP to evaluate and accept software that was developed under other QA programs and software that was developed and supplied by vendors as a component of an overall analytical system. Change control and configuration management of spreadsheet software was also included in the audit evaluation. Review of software lifecycle documentation included software quality plans, V&V plans, test reports, and user manuals for the HENC NDA 2000 and headspace gas analysis system software applications. The audit team determined that software quality activities for vendor-supplied and CCP-developed spreadsheet software were completed adequately and in accordance with procedure,

including configuration management, problem identification and reporting, change control, life-cycle document generation and revision, software V&V, and installation and check-out testing, as appropriate for the classification of the specific software application.

Two software-related concerns were identified during the audit. The first concern regarded the update of the Software Information Summary to show the retirement of software application HGASCAL Rev2.xls, which has been superseded by HSG03-A2.xls (see CDA 6). It was determined that this deficiency was an isolated incident and was corrected during the audit. The other concern, a Recommendation submitted for management consideration, suggested that notes be added to line items to indicate and list major components where a software application is comprised of a suite of configurable components (see Recommendation 3).

Overall, Software activities were determined to be adequate, satisfactorily implemented, and effective.

5.3 Technical Activities

The following sections describe the technical activities reviewed during the audit.

5.3.1 Data Verification and Validation

The audit team evaluated the data V&V process at both the data generation and project levels. The generation-level data reviews are implemented and are required by the process procedures for NDA, nondestructive examination (NDE [RTR]), HSG, and VE. The generation-level reviews were verified through review and evaluation of BDRs and associated documentation. The project-level reviews are accomplished in accordance with Procedure CCP-TP-001. The audit team verified that the procedure adequately addresses the requirements of the CCP QAPjP. The audit team reviewed NDA, RTR, VE, and HSG BDRs and determined that overall, the V&V processes at both the generation and the project levels were adequate, satisfactorily implemented, and effective.

5.3.2 Acceptable Knowledge/Reconciliation of Data Quality Objectives (DQOs)/Sample Design

The audit team examined the TRU waste certification program at LLNL. The program is being conducted for LLNL by the CCP staff utilizing relevant CCP procedures.

The audit team examined AK documentation for two debris waste streams. The first is a mixed debris stream generated from 7/19/85 to 10/23/02 in Buildings 151, 235, 251, 332, and 419, with the bulk of the waste coming from Bldg. 332. The second stream is a non-mixed debris stream segregated and generated beginning on 2/1/96, based upon a very comprehensive analysis of prospective waste generation, particularly with respect to Resource Conservation and Recovery Act (RCRA) contaminants or the absence thereof. The population of containers in this stream includes waste generated

through 8/7/02. The bulk of future generation is anticipated to be non-mixed debris with a much smaller number of mixed waste drums expected in the next 20 years, averaging 2 drums per year. The AK Summary Report CCP-AK-LLNL-001 R.0, *Central Characterization Project Acceptable Knowledge Summary Report for Lawrence Livermore National Laboratory Waste Streams: LL-T002-S5400 and LL-M001-S5400*, dated 2/9/04, provides the WAP and WAC required information for both waste streams. A comprehensive review of this document was conducted by the audit team and a recommended list of corrections and clarifications was provided to the Acceptable Knowledge Expert (AKE) as part of the audit process. Recommendation 5, regarding changes to the LLNL AK Summary, was presented for management consideration.

In addition to reviewing the AK Summary Report, the audit team requested and reviewed all appropriate AK attachments supporting the AK Summary and also examined several AK source documents. Nonconformance Reports (NCRs) dealing with prohibited items in the mixed debris stream were reviewed along with examples of the resolution of discrepancies in the AK record. To date, there have been no identified discrepancies between the AK record and confirmatory testing for these streams. Confirmatory testing has only been conducted on the mixed debris stream to date. The audit team reviewed confirmatory testing BDRs for the five containers that have been through all required confirmatory tests and project level V&V. A draft Waste Stream Profile Form and attachments were also reviewed for this stream, along with other AK documentation supporting the elements of the B6-3 checklist. The audit team also reviewed AK documentation that supports TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) requirements for the issue of sharps/heavy objects and found that the RTR procedure did not specifically direct the operator to look for these items. This concern became CDA 7 with the issuance of a revised procedure.

CBFO CAR 04-20 was issued to the AK program as a result of the combining of containers of absorbed or solidified liquids that clearly fit the definition of the Solids Summary Category Group S3000, into the mixed debris waste stream. Nevertheless, the AK Program was judged to be adequate with regard to addressing the WAP and WAC requirements and satisfactory and effective in implementation and compilation of AK information.

5.3.3 Nondestructive Assay

The audit team evaluated one NDA system operated by the LLNL/CCP in Livermore, CA. The system is discussed below.

High Efficiency Neutron Counter (HENC) System

The HENC system is housed in a trailer located in the Building 695 yard at LLNL. The HENC is operated by Canberra Industries (MCS) for CCP and consists of two measurement components: a passive neutron detection system that measures Pu-240_{EFF}; and, a passive gamma detection system. The neutron component performs a quantitative analysis that is used in conjunction with gamma-derived isotopic values to

provide assay results for a series of TRU radionuclides. The HENC incorporates a Cf-252 Add-A-Source to determine sample-specific matrix corrections and has an operational range of the lower limit of detection (LLD) to 200 g of weapons grade plutonium (WG Pu), also expressed as the LLD to 11.5 g Pu-240_{EFF}. Samples that indicate an AAS correction factor of greater than 2.5 require expert review. The gamma system provides isotopic values using Multi Group Analysis (MGA) and also functions in a stand-alone capacity to provide quantitative values for TRU and other WIPP-tracked radionuclides. The gamma system's operational range with respect to matrix is determined as a function of sample density over the range of 0.0187 to 1.589 g/cm³. There is no explicit gamma upper mass limit, although the system's dead-time functions as a *de facto* mass limit. Non-measured WIPP-tracked radionuclides (U-234, Sr-90 and Pu-242) are determined by the application of scaling and/or correlation factors, as described in CCP operational procedures. Additionally, default isotopics based on site-specific AK are used when MGA is unable to produce useable data. The HENC is configured to assay 55-gallon (208-liter) drums of WIPP wastes and had not been previously approved by CBFO for characterizing TRU wastes. This audit consisted of reviewing CCP operating procedures and reports for performance testing prepared by MCS. Using the current versions of CCP procedures provided prior to the audit, a checklist was prepared and used to assess the following aspects of the CCP LLNL HENC system:

Operability and condition of equipment

System performance testing, including initial calibrations, calibration confirmations and verifications; mass and AAS neutron calibrations; and gamma efficiency and energy calibrations

Determination and documentation of the HENC's LLD and total measurement uncertainty (TMU)

- Ability of system to discriminate TRU and non-TRU wastes at 100 nCi/gram for neutron and gamma determinations
- Pedigree and/or traceability of radionuclide sources used for calibrations
- Applicability of the HENC's operational ranges to waste type (matrix) and radionuclide content of samples assayed

Participation in the CBFO approved NDA PDP for drums

Empirical criteria and mechanism to support using neutron/gamma isotopic values or quantitative gamma results

- Implementation and effectiveness of instrument/measurement controls
- Performance and evaluation of the weekly interfering matrix checks
- Completed BDRs to ensure data are reported and reviewed as required

The audit involved interviewing LLNL CCP and MCS personnel and examining records. Three concerns were identified, which were corrected during the audit. The first concern (see CDA 8) was that the CCP HENC *Calibration and Validation Plan and Report* (CCP-LLNL-NDA-001) is inadequate because it did not reflect the actual calibration practices and contained several errors. The second concern (see CDA 9) was that CCP-TP-109 did not accurately present the technical deviation and application of scaling factors for U-234, Pu-242 and Sr-90. The information in Appendix 1 was not

consistent with the January 7, 2004, Wastren document with respect to calculating U-234. The last concern identified related to the documentation of the HENC's TMU, which was identified and recorded in CBFO CAR 04-026. Specifically, the CCP Report *Total Measurement Uncertainty for the WIPP High Efficiency Neutron Counter (HENC)*, CI-LLNL-NDA-0424, Revision 2, contains several errors and does not fully represent the contribution of the determination of drum density to the TMU for the system. The HENC was found to be adequate in all other respects.

Overall, with the exception of the deficiency cited above, the audit team determined that the CCP NDA process was adequate, satisfactorily implemented, and effective.

5.3.4 Real-Time Radiography (RTR)

The audit team evaluated the procedures and examined the documentation generated as a result of the operation of the mobile RTR system. Resulting BDRs were reviewed and evaluated, along with the associated videotapes. The completed training records for all of the NDE operators were reviewed to assure that proper training was completed in compliance with the requirements of the WAP.

The audit team determined that the CCP RTR process procedures were adequate, satisfactorily implemented, and effective.

5.3.5 Visual Examination

The audit team evaluated the VE operations performed by CCP personnel. The VE operations were confirmed via review and evaluation of the documented objective evidence generated as a result of the implementing procedures. The audit team examined VE BDRs LL04-VE-0001 through 0008. The audio/video recordings for BDRs LL04-VE-0001, 0003, and 0007 were also reviewed. The completed training records for the VE experts and VE operators were verified to assure that proper training was completed in compliance with the requirements of the WAP.

The audit team determined that the VE processes were adequate, satisfactorily implemented, and effective.

5.3.6 Headspace Gas Sampling and Analysis

The audit team evaluated the sampling and analysis procedures for HSG, as performed by the CCP on-line integrated system. The sampling and analysis processes were verified via review and evaluation of the documents and records generated as a result of procedural requirements.

During the audit, HSG sampling of LLNL drums was evaluated. The analysis via online HSG sampling and analysis unit HSG-05 was observed during a demonstration on May 4, 2004.

Drum sampling operations, BDR preparation and BDR V&V through the data-generation level were examined. Analysis of the PDP for Cycle 18A was evaluated

A demonstration of sampling and analysis operations was performed for the audit team on May 4, 2004. Drum equilibration time and drum age criteria (DAC) were checked and acceptable. HSG online sampling and analysis equipment was verified. Initial and continuing calibration, bromofluorobenzene (BFB) tune, and quality control (QC) sample results were verified to be acceptable. Operator qualification and training was satisfactory. PDP Cycle 18A results were verified to be acceptable.

BDRs LL04-HSG-0001 and LL04-HSG-0004 were examined. Data generation-level V&V by the Independent Technical Reviewer (ITR), Technical Supervisor (TS) and Quality Assurance Officer (QAO) on these two reports was satisfactory. The audit team determined that the HSG operations and sampling and analysis processes were satisfactory and the equipment was compliant with the WIPP WAP.

The audit team identified seven concerns. Procedure CCP-TP-056, attachment 4 had several compounds misspelled. Three are listed as alkanes instead of alkenes, (see CDA 1). MDL values were listed in the Method Detection Limit Report as ng/0.0100 ml, not ng as required (see CDA 2). BFB reported in the BDRs is the first "passing" BFB scan, instead of the apex scan as required (see CDA 3). Initial calibration (ICAL) percent relative standard deviation (%RSD) is shown as " $\leq 35\%$ ", not " $< 35\%$ ", as required (CDA 4). Procedure CCP-TP-091, attachment 18 requires target analyte list (TAL) ions to be $\pm 20\%$ instead of the required $\pm 30\%$ (CDA 5). These were isolated deficiencies that were corrected during the audit. The audit team recommended changing the Procedure CCP-TP-090 title to accurately describe the system being used, (Recommendation 1). It was also recommended that the PDP coordinator be informed that the system being used is "HSG-05" and not "HGAS-05," (Recommendation 2).

The audit team determined that the CCP HSG sampling and analysis operations were adequate, satisfactorily implemented, and effective.

Performance Demonstration Program (PDP)

The audit team examined PDP documentation and interviewed CCP personnel. The audit team verified that the CCP had successfully passed the PDP cycle 18 for HSG. The audit team determined that the PDP process had not been completed for NDA at the time of the audit and that results of participation were indeterminate. The audit team informed LANL/CCP program management that NDA would have to successfully complete this activity prior to shipment to WIPP.

Waste Certification/WWIS Data Entry

The audit team evaluated the WWIS data entry process and verified that the process and the implementing CCP procedures were in compliance with the requirements of the CCP QAPjP and CCP TRU Waste Certification Plan. The evaluation included a

demonstration of manual data transfer to the WWIS and a QA validation of the data entered. It was demonstrated that data could be successfully input into the WIPP database. The generation of record packages was demonstrated, including the printed and verified data entry forms and WWIS acceptance reports.

The audit team concluded that the data entry procedures are adequate, satisfactorily implemented, and the process is effective.

CARs, CDAs, OBSERVATIONS, AND RECOMMENDATIONS

The two CARs briefly described below were initiated as a result of Audit A-04-25, and have been transmitted to CCP management under separate cover.

Corrective Action Reports

During the audit, the audit team may identify conditions adverse to quality (CAQs) and document them on corrective action reports (CARs).

Condition Adverse to Quality (CAQ) – Term used in reference to failures, malfunctions, deficiencies, defective items, and nonconformances.

Significant Condition Adverse to Quality – A condition which, if uncorrected, could have a serious effect on safety, operability, waste confinement, TRU waste site certification, compliance demonstration, or the effective implementation of the QA program.

CBFO CAR 04-020

In the AK Summary Report for LLNL, CCP-AK-LLNL-001, R.0, dated 2/9/04, a mixed debris stream is identified that is generated by the major TRU facilities on-site, including Buildings 332, 251, and 419. The description of the waste stream includes the presence of smaller containers of solidified liquid waste, both organic and inorganic, solidified using a variety of solidification agents. The statement is made on page 63 that "there are individual containers with greater than 50% by volume homogeneous solids (solidified liquids); however, the overall average is significantly less than 50 percent." There are, in fact, at least 27 containers in the inventory that are primarily solidified liquids. The consolidation of two summary category groups into one debris stream is not justified based upon the information presented.

6.1.2 CBFO CAR 04-026

CCP Report *Total Measurement Uncertainty for the WIPP High Efficiency Neutron Counter (HENC)*, Revision 2, contains several errors and does not fully represent the contribution of the determination of drum density to the TMU for the system.

6.2 Deficiencies Corrected During the Audit (CDAs)

The audit team identified nine conditions adverse to quality that were considered isolated deficiencies and were corrected during the audit.

CDA 1

CCP-TP-056, attachment 4 has compounds misspelled. Three compounds are listed as alkanes instead of alkenes. WAP Table B3-2 requires alkenes to be listed.

Procedure CCP-TP-056, attachment 4 was revised during the audit. The auditor reviewed the changes and determined they were acceptable.

CDA 2

The MDL values listed in the Method Detection Limit Report were being reported as "ng/0.100 ml" and not "ng" as required. WAP Table B3-2 requires the values to be in "ng".

The Method Detection Limit Report was revised. The auditor reviewed the changes and determined they were acceptable.

CDA 3

BFB was being reported in the data packages as the first "passing" BFB scan. CCP-TP-090, section 4.2.1[h] Note, details how BFB is to be evaluated using the Apex scan. SW-846 method 8260 B section 7.3.1.1 requires the Apex scan.

BFB was revised to use the Apex scan. The auditor reviewed the changes and determined they were acceptable.

CDA 4

ICAL %RSD is " \leq " 35%, while the WAP requires "<" 35%. CCP-TP-090 also requires "<" 35% in the text and Table 8.

ICAL %RSD limits were revised to meet requirement. The auditor reviewed the changes and determined they were acceptable.

CDA 5

CCP-TP-091, attachment 18 requires TAL ions to be +/- 20% between the reference spectrum and the sample spectrum. SW-846, method 8260 B, section 7.6.1.3 requires +/- 30% ion matching.

CCP-TP-091, attachment 18 was revised to use the limits of +/- 30%. The auditor reviewed the changes and determined they were acceptable.

CDA 6

Software Information Summary (Software Inventory List) needs to be updated to show the requirement of software application HGASCAL Rev2.xls, which has been superseded by HSG03-A2.xls.

The Software Information Summary (Software Inventory List) was updated to HSG03-A2.xls. The auditor reviewed the changes and determined they were acceptable.

CDA 7

CCP-TP-102, R.1, CCP-RTR #2 Radiography inspection operating procedure does not direct the operator to look for sharp objects presenting a penetration potential or bracing of heavy objects as required by the TRAMPAC section 2.7. The SPQAO checklist addresses the criteria in item 23 using the RTR description of contents. However, the RTR procedure should have specifically addressed this requirement.

CCP-TP-102 was revised to address the requirement. The auditor reviewed the changes and determined they were acceptable.

CDA 8

CCP HENC Calibration and Validation Plan and Report (CCP-LLNL-NDA-001) is inadequate. It does not reflect the actual calibration practices and contains several errors.

The CCP HENC Calibration and Validation Plan and Report (CCP-LLNL-NDA-001) was revised. The auditor reviewed the changes and determined they were acceptable.

CDA 9

CCP-TP-109 does not accurately present the technical deviation and application of scaling factors for U-234, Pu-242, and Sr-90. Information in appendix 1 is not consistent with the January 7, 2004, Wastren document with respect to calculating U-234.

CCP-TP-109 was revised to change the scaling factors for U-234, Pu-242 and Sr-90 and appendix 1 to reflect the Wastren document. The auditor reviewed the changes and determined they were acceptable.

Observations

The audit team did not make any Observations as a result of the audit.

6.3 Recommendations

The audit team provided the following Recommendations to CCP management for consideration, concerning improvement of the CCP processes and procedures.

Recommendation 1

Procedure CCP-TP-090 is titled *CCP Headspace Gas sampling Using the Automated Manifold System*. The use of the word "manifold" in the title of this procedure is inaccurate – the system is actually an "on-line integrated" system. In the WAP, there are requirements for a "manifold" system that are not 100% applicable to an on-line system.

Recommend: Changing the procedure title to accurately describe the system being used.

Recommendation 2

PDP approval letter dated 4/28/04 identifies and authorizes HSG Sample Analysis for LLNL/CCP using instrument "HGAS-05". All forms in the headspace BDRs identify sample analysis being done on instrument "HSG-05".

Recommend: Informing the PDP coordinator that the system being used is "HSG-05".

Recommendation 3

"HGAS System Software" and "Genie/NDA 2000" software information summary line items show adequate status of these two applications.

Recommend: Notes should be added to each line item to indicate the major components of the suite (e.g., add "HGAS II.exe", "HGAS II121.bin", and Analysis.exe" component names to the "HGAS System Software" line item and add "NDA2000" and "Genie200" component names to the "Genie/NDA2000" line item). This will provide notification to users of all major components that are installed for the suite. The inventory is adequate as presented and the recommendation is to show these two line items in a similar fashion as other suite/component items are shown on the inventory.

Recommendation 4

CCP technical supervision provides review of training materials, but there is no method to document the review on the qualification card.

Recommend: A signature/date line item be added to the qualification card to document this review.

Recommendation 5

Recommend: The following changes are recommended to the LLNL AK Summary Document, CCP-AK-LLNL-001 R.0. These changes will correct typographical errors and/or omissions and will provide clarity to understanding the AK record for the subject

waste streams. These changes have been discussed individually and in detail with the CCP AK expert during the audit.

- a) Correct errors in the table of contents. Sections have been repeated.
- b) Page 12: The list of EPA Hazardous Waste Codes for LL-M001-S5400 needs to be compared to table 5-4 on page 70 to ensure consistency. D018 was inadvertently left off of the table 5-4 and should be added. It is noted that D018 is justified in the text on page 78.
- c) Page 20, paragraph 2, Add text to indicate why shipments of TRU waste to the Nevada Test Site (NTS) were not restarted.
- d) Page 20, section 4.3.1: Provide clarification regarding the term "combined TRU waste." In addition, clarify when California codes are added to the waste stream description and paperwork.
- e) Page 22, section 4.4.1, 2nd paragraph: The last sentence could give the reader the impression that this is truly a quantitative measurement of both radionuclides and hazardous constituents. It is recommended that the sentence be modified to note that this is at best a semi-quantitative process.
- f) Page 26, section 4.5: Clarify that the first two paragraphs are only a source of AK information and that the CCP certification plan will be the controlling document for certifying LLNL TRU waste. Modify the 4th sentence of paragraph 1, "The LLNL Radioactive Waste Program now includes TRU waste", to indicate past tense.
- g) Page 27, section 5.0, bullet 3: Text should be added to this section and section 5.4.3 to expand upon the process knowledge evaluation (PKE) process and how that has been effectively utilized by LLNL staff to justify not assigning hazardous waste codes to waste parcels removed from processes/boxlines that contain or could contain hazardous constituents.
- h) Page 35, paragraph 3: The text in this paragraph is confusing and does not reflect nor is it supported by information in other sections of the AK summary. This text should be revised to indicate that the AK record is supportive of the HWNs and radionuclide mixes applied and no significant gaps in AK information identified.

- i) Page 35, paragraph 4: Clarify that the graphite molds are classified TRU waste and what their fate will be. Correct the reference at the end of the paragraph.
- j) Page 35, paragraph 5: The AK Source documentation indicates that any commercial TRU waste such as that from the Plowshare Program was commingled with defense waste. Change the tense in the referenced text to reflect that the Plowshare waste has already been commingled.
- k) Page 64, section 5.4.1.2: The text needs to be clarified in this section where soil is mentioned, it needs to indicate that the drums are not full of soil from some environmental restoration activity but rather small samples from the analysis of underground nuclear test shots. This is not S4000 waste.
- l) Page 72, section 5.4.3, et al., see item 7: Discussions with the AKE and objective evidence reviewed indicate how codes are added to the process, however this was not fully documented in this section of the AK summary. Expand the discussion of the Process Knowledge Evaluation (PKE) to demonstrate and justify how codes are added/not added to waste items exiting the box line from areas where hazardous materials are/may be present.
- m) Page 86: Develop a crosswalk for the record between the NTS and LLNL AK source document reference list.

7.0 ATTACHMENTS

Attachment 1: Personnel Contacted During the Audit

Attachment 2: CCP Documents/Procedures Evaluated During the Audit

Attachment 3: Summary Table of Audit Results

PERSONNEL CONTACTED DURING THE AUDIT				
NAME	TITLE/ORG	PRE AUDIT MEETING	CONTACTED DURING AUDIT	POST AUDIT MEETING
Alvord, Bob	DOE/ESD	X		
Anson, Jim	Field Operation Supervisor			X
Behanna, James	NDA Operator		X	X
Billett, Bob	LLNL/ CCP PM/VPM	X	X	X
Chiulli, Joshua	NDA Operator		X	X
Coburn, Tony	RCA LLNL		X	X
DeMicco, Mike	QA Manager, RHWM			X
DiSabatino, Al	Acting Division Manager LLNL/EPD	X		X
Djordjevic, Sinisa	SQA Weston/CCP		X	
Doherty, Mark	AK/CCP		X	
Donohoue, Tom	NDA Operator		X	X
Ewing, Steve	NDE SME MCS	X	X	
Fisher, A.J.	CCP QA Manager	X	X	X
Freeze, Deborah	CCP Training Specialist	X	X	X
Gillespie, Bruce	NDA MCS	X	X	
Goodwin, Stephanie	Division Leader RHWM	X		X
Haar, Dave	CCP Program Manager	X	X	X
Harrison, Jeff	Acceptable Knowledge Expert	X	X	X
Hedahl, Tim	Manager, NTP	X		

PERSONNEL CONTACTED DURING THE AUDIT

NAME	TITLE/ORG	PRE AUDIT MEETING	CONTACTED DURING AUDIT	POST AUDIT MEETING
Hollister, Rod	RHWM Transuranic Project Manager	X	X	X
Jensen, Michelle	CCP/L&M/Records		X	
Kirkes, Billy	SPM CCP	X	X	
Kong, Robert	DOE/WM Project Manager	X		X
Lamb, Greg	RTR Operator		X	X
Lamb, Larry	RTR Operator			X
Loft, Mike	LLNL HGAS Technician		X	
Machado, Richard	NDA MCS	X	X	X
Michels, Ron	WCP GAO LLNL	X		
Medlin, Beverle	HSG Operator			X
Mooney, Dean	CCP SPQAO	X	X	X
Nance, Sherri	CCP SPQAO		X	
Padilla, Harvey	HSG Operator		X	X
Pearcy, Sheila	Lead CCP Records Custodian	X	X	X
Pelleginni, William	EPD/HWM		X	
Pennala, Eric	NDE/NDA MCS	X		
Perkins, Brian	Waste Certification Program	X		X
Porter, Larry	SPM CCP/WTS	X	X	
Romo, Abraham,	Visual Exam Expert CCP	X	X	X

PERSONNEL CONTACTED DURING THE AUDIT				
NAME	TITLE/ORG	PRE AUDIT MEETING	CONTACTED DURING AUDIT	POST AUDIT MEETING
Romo, Favian	VE Operator		X	X
Rossman, Jerry	EPA Contractor	X		
Slininger, Brad	LLNL HGAS Technician		X	
Stepzinski, Charles	CCP Tech. Writer, L&M	X	X	X
Stroble, J. R.	CCP/WTS, WCO Manager, Project Cert.	X	X	
Vukelich, John	Training Manager RHWM	X		
Walker, LJ	VEE CCP		X	X
Warner, Roy	TRU Waste Coordinator			X
Williams, Michael	HSG CCP/WTS	X	X	X
Warwick, Keith	DOE Facility Representative	X		X
Zappe, Steve	NMED			X

CCP DOCUMENTS/PROCEDURES EVALUATED DURING THE AUDIT

Number	Procedure Number/Rev	DOCUMENT TITLE
1	CCP-PO-001/R8	CCP Transuranic Waste Characterization Quality Assurance Project Plan
2	CCP-PO-002/R9	CCP Transuranic Waste Certification Plan
3	CCP-PO-008/R4	CCP Quality Assurance Administrative Program
4	CCP-PO-014/R2	CCP LLNL Interface Document
5	LLNL Statement of Work	Lawrence Livermore National Laboratory Statement of Work for Characterization of LLNL TRU Waste
6	CCP-QP-001/R3	CCP Graded Approach
7	CCP-QP-002/R15	CCP Training and Qualification Plan
8	CCP-QP-004/R5	CCP Corrective Action Management
9	CCP-QP-005/R9	CCP TRU Nonconforming Item Reporting and Control
10	CCP-QP-006/R5	CCP Corrective Action Reporting and Control
11	CCP-QP-008/R9	CCP Records Management
12	CCP-QP-010/R11	CCP Document Preparation, Approval and Control
13	CCP-QP-011/R4	CCP Notebooks & Logbooks
14	CCP-QP-015/R6	CCP Procurement Program
15	CCP-QP-016/R8	CCP Control of Measuring, Testing, and Data Collection Equipment
16	CCP-QP-017/R2	CCP Identification and Control of Items
17	CCP-QP-018/R3	CCP Management Assessments
18	CCP-QP-019/R2	CCP Quality Assurance Reporting to Management
19	CCP-QP-021/R3	CCP Surveillance Program
20	CCP-QP-022/R3	CCP TRU Software Quality Assurance
21	CCP-QP-023/R1	CCP Handling, Storage, and Shipping
22	CCP-QP-026/R6	CCP Inspection Control
23	CCP-QP-	CCP Test Control

CCP DOCUMENTS/PROCEDURES EVALUATED DURING THE AUDIT

Number	Procedure Number/Rev	DOCUMENT TITLE
	027/R2	
24	CCP-QP-028/R5	CCP Records Filing, Inventorying, Scheduling, and Dispositioning
25	CCP-TP-001/R10	CCP Project Level Data Validation and Verification
26	CCP-TP-002/R13	CCP Reconciliation of Data Quality Objectives
27	CCP-TP-003/R14	CCP Sampling Design and Data Analysis for RCRA Characterization
28	CCP-TP-005/R13	CCP Acceptable Knowledge Documentation
29	CCP-TP-028/R2	CCP Radiographic Test and Training Drum Requirements
30	CCP-TP-030/R11	CCP TRU Waste Certification & WWIS Data Entry
31	CCP-TP-041/R10	CCP Preparing and Handling Waste Drum for Visual Examination
32	CCP-TP-056/R3	CCP HSG Performance Demonstration Plan
33	CCP-TP-058/R1	CCP NDA Performance Demonstration Plan
34	CCP-TP-090/R2	CCP Headspace Gas Sampling Using the Automated Manifold System
35	CCP-TP-091/R0	CCP HSG Data Generation and Batch Data Reporting using the Automated system
36	CCP-TP-102/R1	CCP RTR #2 Radiography Inspection Operating Procedure
37	CCP-TP-104/R1	CCP Preparing and Handling Waste Drums for Headspace Gas at Lawrence Livermore National Laboratory
38	CCP-TP-105/R1	CCP Container Management at Lawrence Livermore National Laboratory
39	CCP-TP-107/R2	Operating the CCP High Efficiency Neutron Counter Using NDA 2000
40	CCP-TP-108/R1	Calibrating the CCP High Efficiency Neutron Counter Using NDA 2000
41	CCP-TP-109/R0	Data Reviewing, Validating and Reporting for the CCP High Efficiency Neutron Counter Using NDA 2000
42	CCP-TP-114/R2	CCP-Waste Visual Examination

LLNL/CCP (A-04-25) SUMMARY TABLE OF AUDIT RESULTS May 4-7, 2004

EVALUATED QA AND TECHNICAL ELEMENTS	Concern Classification				QA / Technical Evaluation		
	CARs	CDAs	OBSs	RECs	Program Adequacy	Program Implementation	Program Effectiveness
Acceptable Knowledge	04-020	7		5	A	S	E
Sample Design / Reconciliation of DQOs					A	S	E
Headspace Gas Sampling & Analysis		1-5		1-2	A	S	E
Nondestructive Assay (HENC)	04-026	8-9			A	S	E
RTR #2 System					A	S	E
Organization / QA Program					A	S	E
Software QA		6		3	A	S	E
Procurement					A	S	E
Document Control					A	S	E
M&TE for Data Collection					A	S	E
Program Interfaces / Statement of Work					A	S	E
CARs / NCRs / Corrective Action					A	S	E
Project Level Data V & V					A	S	E
Visual Examination					A	S	E
Audits and Assessments					A	S	E
WWIS Data Entry					A	S	E
Identification of Items / Handling, Storage, Shipping					A	S	E
Personnel Qualification / Training			4		A	S	E
Work Control Processes					A	S	E
Records Management					A	S	E
Performance Demonstration Program (PDP)					I	I	I
SUMMARY	2	9		5	A	S	E

LEDGEND: CARs = Corrective Action Reports; CDAs = Concerns Corrected During the Audit; OBSs = Observations; RECs = Recommendations
ADEQUACY/EFFECTIVENESS STATEMENTS: A = Adequate; S = Satisfactory; U = Unsatisfactory; E = Effective; I = Indeterminate; M = Marginal;